

Public Health and Infectious Disease Information for Legal and Court Personnel

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Public Health and Control of Infectious Disease

- Mandate to protect the public's health
- Disease reporting statutes and rules
 - Infectious disease
 - Environmental (lead)
 - Chronic disease (cancer, birth defects)
- Isolation and quarantine powers related to infectious diseases

Infectious Disease Transmission

- Little or no person-to-person transmission
 - Zoonotic diseases (e.g., West Nile virus or rabies) where transmission normally dead ends in human host
- Person-to-person transmission common
 - Varicella virus (chickenpox)
 - Measles
- Isolation & quarantine decisions related to ease and route of transmission

Potential Agents of Bioterrorism with Person-to-Person Transmission

- **Smallpox**
 - Isolate cases
 - Contacts vaccinated and on fever watch for 18 days after last exposure or 14 days following successful vaccination (if $>101^{\circ}\text{F}$ x 2 readings then isolate)
- **Pneumonic Plague**
 - Isolate cases x72 hours after initiation of antibiotics and clinically improved
 - Contacts < 3 feet of plague patient should receive chemoprophylaxis
- **Viral Hemorrhagic Fever**
 - Isolate cases for duration of illness
 - Fever and symptom watch x 21 days for persons exposed to blood, secretions or excretions from an infected person

Airborne Infectious Diseases

- Airborne infectious diseases are the most communicable because infectious particles expelled from an infected person can travel on air currents and infect persons at some distance from the infected person
- The greater the force and pressure involved in the generation of an aerosol, the smaller the particle size and the farther it will travel

Infectious Particles

- **Droplet:**
 - Particles >5 microns in diameter (there are 25,400 microns in one inch), which typically travel less than 3 feet in the air
 - Particles may be deposited in the eyes, nose, or mouth of persons within 3 feet of an infected person
- **Airborne:**
 - Particles may be dispersed widely
 - Particles 1 – 5 microns in diameter can enter the upper airway
 - Particles 0.1 – 1 microns in diameter can enter the lower lungs and alveolar ducts

What Attorneys and Court Personnel Need to Know about Infection Control

- Persons under quarantine have been exposed, but are well and may or may not be infectious to others—some diseases may be transmitted prior to symptom onset, others are not (e.g., SARS)
- Persons under isolation are ill and infectious
- How can infectious persons be accommodated in our court system?
- How can attorneys and others who may be exposed to infectious persons outside of a healthcare setting be protected from infectious disease?

Infection Control Terminology in Healthcare Settings

Standard Precautions:

- Hand hygiene: gloves for blood and other body fluids exposure, mucus membranes and non-intact skins
- Masks, eye protection, face shields and gowns if splashes of blood or body fluids likely

In addition to Standard Precautions, additional transmission-based precautions may also be indicated:

- Droplet: private room, surgical mask if within 3 feet of patient
- Contact: private room, gloves and gowns
- Airborne (TB, varicella, measles):
 - Negative pressure isolation room with ≥ 6 air changes per hour
 - Exhaust outside or through high efficiency particulate air (HEPA)
 - Respiratory protection (use of respirators)

Example: Principles of Isolation and Smallpox Transmission

- Most transmission through direct, face-to-face contact
 - Respiratory droplet with close contact
- Rarely airborne transmission
 - Cough
- Rarely fomite transmission
 - Clothing contaminated with dried respiratory secretions or lesion drainage

Droplet Transmission



Transmission-based Precautions: Smallpox

- Airborne precautions (airborne transmission rare but can occur)
- Droplet precautions (droplet transmission most common route & also prevented when airborne precautions instituted)
- Contact precautions (rare but can occur)

Hand Hygiene

- Hand hygiene is the new term for handwashing and also includes the use of alcohol-based hand rubs (unless hands visibly soiled)
- Hand hygiene is the single most important measure that can be taken to prevent the spread of infectious disease



Hand Hygiene is Critical



Respiratory Protection

- Respirator
 - a personal protective device that is worn on the face, covers at least the nose and mouth, and is used to reduce the wearer's risk of inhaling hazardous airborne particles
- Two types of respirators are used in healthcare settings:
 - Disposable particulate respirators, which filter out airborne particles
 - Powered air purifying respirators (PAPRs); battery-powered blower moves the air flow through the filters

Disposable Particulate Respirators

- "N95" respirators are the most common respirators used in healthcare settings; respirators are rated by NIOSH for fit, filter efficiency (worst case testing) and protection against oils
- Filter efficiency (% of airborne particles filtered)
 - $\geq 95\%$ - "95" rating
 - $\geq 99\%$ of airborne particles - "99" rating
 - $\geq 99.97\%$ of airborne particles "100" rating
- Oil resistance (not a factor in healthcare settings so respirators of the "N" series used)
 - "N" if they are not resistant to oil
 - "R" if somewhat resistant to oil
 - "P" if strongly resistant to oil (oil proof)

N95 Respirators



N95 Respirators

- Fit/seal is critical – OSHA requires “fit testing” prior to first use, annually, and when type of respirator used changes
- Not everyone can tolerate a respirator
 - E.g., persons with asthma or emphysema, or a history of heart disease
 - OSHA requires medical evaluation prior to fit test
- Do not seal effectively for people with beards
- A “seal check” respirator offers more protection to the wearer than a surgical mask
- An alternative to an N95 is a powered air purifying respirator (PAPR)
- OSHA information: www.osha.gov

OSHA’s Respiratory Protection Standard 29 C.F.R. 1910.134

- Applies to all occupational airborne exposures to contaminated air when the employee is:
 - Exposed to a hazardous level of an airborne contaminant or microorganism;
 - Required by the employer to wear a respirator; or
 - Permitted to wear a respirator
- Four major duties are imposed by the standard
 - Use engineering controls (e.g., special air handling and ventilation) where feasible to control the hazard;
 - Provide an appropriate respirator;
 - Ensure the use of an appropriate respirator; and
 - Institute a respiratory protection program

OSHA Requirements

- Employer must provide a medical evaluation to determine the employee's ability to use a respirator before the employee is fit tested
- Fit testing must be done prior to the use of a disposable particulate respirator, and whenever a different brand of respirator is worn; and at least annually
- Employer must provide effective training to employees who are required to use respirators

N95 Respirator Effectiveness

- The face-to-facepiece seal critical
- Particulate respirators must not be worn by persons who have facial hair or any condition that interferes with the face-to-facepiece seal
- Persons wearing particulate respirators must perform a user "seal check" each time they put on a respirator



Surgical Mask vs. N95 Respirator

- Surgical masks are not designed as respirators and do not provide as much protection as an N95 respirator
- Most surgical masks do not effectively filter small particles from the air and do not prevent leakage around the edge of the mask when the user inhales
- A respirator is designed to reduce the exposure of the wearer to airborne hazards and can filter sub-micron aerosols
- The primary design purpose of a surgical mask is to filter or redirect particles expelled by the wearer

Infection Control for Outside Healthcare Settings: SARS

- Airborne and Contact Precautions plus eye protection, in addition to Standard Precautions should be implemented:
 - Respiratory protection (N95 respirator or PAPR)
 - Fluid resistant gown
 - Gloves
 - Eye Protection (goggles or face shield)
- Avoid touching face with contaminated gloves
- Careful hand hygiene is critical; wash hands, with antimicrobial soap and water or use an alcohol-based hand rub (if hands are not visibly soiled) after glove removal

What Else Might You Want to Consider: Court Hearings for Non-Compliant SARS Patients

- Telephonic hearings can be attempted (preferable?)
- ITV (interactive television) hearings possible, but would require personnel to set up and run the equipment
 - Personnel need to wear respirators and gloves if in the same room as the SARS patient (in some circumstances, such as hearings occurring in patient's room, donning a gown may be appropriate for personnel)
 - Personnel should perform hand hygiene upon exiting the room
 - Equipment needs to be wiped down with disinfectant following use

Court Hearings for Non-Compliant SARS Patients (cont.)

- If the attorney or client requests a courtroom hearing:
 - Persons in the courtroom should be limited to those who are essential
 - Attorneys, courtroom personnel and others should use respiratory protection (at a minimum) and should also use gowns, gloves and eye protection if anticipating direct contact with the patient; hand hygiene should be performed upon leaving the courtroom
 - SARS patients should wear a surgical mask and clean gown when in the courtroom and should perform hand hygiene before entering courtroom
 - Courtroom doors should be kept closed during the hearing and engineering controls (air handling and ventilation) should be used, if possible
 - After hearing, courtroom should be closed and not used until the next day
 - Items in contact with the patient must be cleaned and disinfected after courtroom reopened, persons performing this activity should wear gowns and gloves

Control of Disease Transmission: Community Containment

CDC term for community-level measures to control transmission of disease:

- Isolation and quarantine
- "Snow days"
- Restrictions on group assembly
- Cancellation of public events, closure of public places
- Closure of mass public transit
- Restriction or scaling back of non-essential travel
- Cordon sanitaire (sanitary or quarantine line)

Definitions

- *Isolation*: restriction of movement/ separation of sick infected person(s) with contagious disease
- *Quarantine*: restriction of movement/ separation of well person(s) presumed exposed to a contagious disease
- *Perimeter Quarantine/Cordon Sanitaire*: general travel restrictions on entering and/or leaving area with contagious disease outbreak

"Quarantinable Diseases"

Executive Order 13295: Revised list of quarantinable communicable diseases (April 4, 2003):

- Cholera
- Diphtheria
- Infectious tuberculosis
- Plague
- SARS
- Smallpox
- Yellow fever
- Viral hemorrhagic fever (Lassa, Marburg, Ebola, Crimean-Congo, South American, and others not yet isolated or named)

Section 36(b) of the Public Health Service Act, Title 42
US Code Section 264(b)

When are Isolation and Quarantine Indicated?

- A person or group of people has been exposed to a highly dangerous and contagious disease
- Exposed "well" can be separated from "ill cases"
- Resources are available to implement and support interventions
 - Ensure essential needs
 - Monitor health status
 - Implement isolation of those who become ill
- Quarantine should continue only as long as necessary to ensure that quarantined persons do not become ill (use incubation period of disease to guide)

SARS Coronavirus (CoV)

- Found in respiratory secretions, saliva, blood, urine and stool of infected patients
- Virus may be stable at room temperature for 48 hours and longer at lower temperatures
- Virus loses infectivity after exposure to commonly used disinfectants or heat (56°C for 15 minutes)
- Some patients may be highly infectious ("super-shedder"), particularly when critically ill
- No evidence of transmission prior to fever but may be transmission during prodromal (period of early symptoms prior to the development of a full blown respiratory illness)
- Period of communicability is up to 10 days following resolution of fever

CDC SARS Case Definition (Spring 2003)

- Clinical Criteria
 - Temperature of $>100.4^{\circ}\text{F}$ ($>36^{\circ}\text{C}$) and
 - One or more clinical findings of lower respiratory illness (e.g., cough, shortness of breath, difficulty breathing)
- Epidemiologic Criteria
 - One or more of the following exposures in the 10 days before onset of symptoms:
 - Travel to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV or
 - Close contact with a person with mid-to-moderate or severe respiratory illness and with history of travel in the 10 days before onset of symptoms to a foreign or domestic location with documented or suspected recent transmission of SARS-CoV

CDC Definition of a Close Contact

- Having cared for or lived with a person with SARS
- Having a high likelihood of direct contact with respiratory secretion and/or body fluids of a person with SARS
- Examples of close contact include kissing, sharing eating utensils, close (i.e., < 3 feet) conversation, physical examination
- Close contact does not include walking by a person or sitting across a room for a brief time

Efforts to Contain Spread

- In areas with SARS community spread:
 - Home quarantine
 - Hospital closures
 - School closures
- Internationally:
 - Health alert notices
 - Travel advisories
 - Screening airline passengers

Isolation and Quarantine for SARS

- Isolation of cases until 10 days after resolution of fever and improvement of respiratory symptoms
- Promptly identify, evaluate and monitor close contacts of SARS cases
- If no community transmission is occurring, passive or active monitoring of close contacts for evidence of infection (and the need for isolation) may be conducted
- If community transmission is occurring, quarantine may be recommended to prevent spread of disease from close contacts

SARS in Ontario, Canada

- 250 probable cases and 40 deaths (including three HCW deaths)
- Provincial state of emergency declared on March 26 and lifted May 17, 2003
- Two SARS clusters related to healthcare facilities
- Five hospitals were closed to new admissions, elective surgery canceled at all other hospitals
- Hospital visitor restrictions
- Voluntary quarantine of contacts (23,000) of cases

Home Isolation for SARS

- Before implementing home isolation, ensure that the necessary features for provision of care and infection control precautions are met
 - Availability of caregiver to assist patient with basic needs
 - Access to telephone, electricity, heat and potable water
 - Access to groceries, medications and other needs
 - If multi-family dwelling, separate air handling system (if possible)
 - Ideally, separate bedroom and bathroom for the patient

Home Isolation for SARS (cont'd)

- Patients should not leave home for the duration of the isolation period, except for necessary medical care
- When movement outside of the home is required, the patient should wear a surgical mask and not use public transportation
- Other persons in the household should be limited to those who are essential for patient support
 - Household members who cannot comply with infection control precautions (e.g., young children) should be housed elsewhere
 - Household members at risk of serious SARS complications (e.g., persons with heart or lung disease, elderly, etc.) should be housed elsewhere
- The patient should be separated from other persons in household to the extent possible and contact with patient should be minimized

Follow-up of Exposed Household Members for SARS

- Household members and other close contacts should be vigilant for fever and should measure temperature twice a day
- If fever, respiratory or other symptoms develop such contacts should be medically evaluated
- In absence of symptoms, household members and other close contacts typically need not limit their activities outside the home
- However, under some circumstances, the health department may recommend limiting the activities of exposed, asymptomatic household members and other close contacts

International SARS Containment

- **Isolate symptomatic individuals (communicable phase)**
 - SARS hospitals
 - Home
 - Recovery during period of communicability
- **Quarantine primary asymptomatic contacts (pre-communicable phase)?**
 - Home v. residential facility
 - Fever surveillance of close contacts
- **Community measures: decrease social contacts**
 - Cancel public gatherings
 - Limit translocation, restrict travel

Summary

- Throughout history, working with infectious persons has always involved the risk of infection
- Risk can be minimized by implementation of appropriate infection control precautions but not eliminated entirely
- Please call the Michigan Department of Community Health at 517/335-8165 with questions regarding infection control or the transmission of infectious agents
